CLAIMS

I claim:

1. A method for forming composite components, the method comprising:

(a) providing a mold having a mold cavity, at least a portion of the mold cavity having a selected shape for forming a composite component;

(b) providing sections of adjacent fibers, the fibers being parallel to each other and being coated with a fugitive binder that adheres the fibers to each other;

(c) arranging the fibers within the mold cavity and assembling the mold; then

(d) heating the fibers to a temperature sufficient to pyrolyze the binder; then

(e) injecting resin into the mold cavity, the resin forming a matrix enclosing the fibers; then

(f) curing the resin; and then

(g) removing the composite component from the mold cavity.

2. The method of claim 1, wherein:

a portion of the mold cavity is formed from a vacuum bag.

3. The method of claim 1, wherein:

step (a) comprises providing a mold that has at least one injection port and at least one vent port, the ports communicating an exterior of the mold and the mold cavity; and

step (d) further comprises flowing a gas into the mold cavity through the injection port and out of the mold cavity through the vent port.

4. The method of claim 1, wherein:

step (a) comprises providing a mold that has at least one injection port and at least one vent port, the ports communicating an exterior of the mold and the mold cavity; and

step (d) further comprises flowing a heated gas into the mold cavity through the injection port and out of the mold cavity through the vent port, the heated gas pyrolyzing the fuitive binder.

5. The method of claim 4, wherein:

the gas is nitrogen.

6. The method of claim 1, wherein:

the fugitive binder is an aliphatic, thermoplastic, organic polymer.

7. The method of claim 1, wherein:

the fugitive binder is water soluble.

8. The method of claim 1, wherein:

the fugitive binder is selected from the group consisting of hydroxypropyl cellulose, hydroxyethyl cellulose, hydroxymethyl cellulose, polyvinyl alcohol, polyvinyl pyrrolidone and polyvinyl acetate.

9. The method of claim 1, wherein:

the fibers are formed from a plurality of carbon fibers.

10. The method of claim 1, wherein:

the fibers are formed from a material selected from the group consisting of glass, ceramic oxide, alumina, aluminosilica, alumina zirconia yttria, aluminoborosilicate, and silicon carbide.

11. The method of claim 1, wherein:

step (f) comprises heating the mold.

12. A method for forming composite components, the method comprising:

(a) providing mold having a mold cavity, at least a portion of the mold cavity having a selected shape for forming a composite component, the mold also having at least one injection port and at least one vent port, the ports communicating an exterior of the mold and the mold cavity;

(b) providing sections of unidirectional fibers that are coated with a fugitive binder that adheres the fibers to each other;

(c) arranging the fibers within the mold cavity and assembling the mold; then

(d) flowing a gas into the mold cavity through the injection port and out of the mold cavity through the vent port while heating the fibers to a temperature sufficient to pyrolyze the binder; then

(e) injecting resin into the mold cavity through the injection port, the resin forming a matrix enclosing the fibers; then

(f) heating the mold to cure the resin; and then

(g) removing the composite component from the mold cavity.

13. The method of claim 12, wherein:

a portion of the mold cavity is formed from a vacuum bag.

14. The method of claim 12, wherein:

step (d) further comprises heating the gas flowing through the mold cavity prior to flowing the gas through the mold cavity.

15. The method of claim 14, wherein:

the gas is nitrogen.

16. The method of claim 12, wherein:

the fugitive binder is an aliphatic, thermoplastic, organic polymer.

17. The method of claim 12, wherein:

the fugitive binder is water soluble.

18. The method of claim 12, wherein:

the fugitive binder is selected from the group consisting of hydroxypropyl cellulose, hydroxyethyl cellulose, hydroxymethyl cellulose, polyvinyl alcohol, polyvinyl pyrrolidone and polyvinyl acetate.

19. The method of claim 12, wherein:

the fibers are formed from a plurality of carbon fibers.

20. The method of claim 12, wherein:

the fibers are formed from a material selected from the group consisting of ceramic oxide, alumina, aluminosilica, alumina zirconia yttria, aluminoborosilicate, and silicon carbide.

21. The method of claim 12, further comprising:

after step (d) and before step (e), drawing a vacuum on the mold cavity.

22. A tape for forming a composite workpiece, the tape comprising:

(a) adjacent, co-planar fibers, the fibers being parallel to and in contact with each other; and

(b) a fugitive binder coating on the fibers that adheres the fibers to each other, the fugitive binder being pyrolyzable.

23. The method of claim 22, wherein:

the fugitive binder is an aliphatic, thermoplastic, organic polymer.

24. The method of claim 22, wherein:

the fugitive binder is water soluble.

25. The method of claim 22, wherein:

the fugitive binder is selected from the group consisting of hydroxypropyl cellulose, hydroxyethyl cellulose, hydroxymethyl cellulose, polyvinyl alcohol, polyvinyl pyrrolidone and polyvinyl acetate.

26. The method of claim 22, wherein:

the fibers are formed from carbon.

27. The method of claim 22, wherein:

the fibers are formed from a material selected from the group consisting of ceramic oxide, alumina, aluminosilica, alumina zirconia yttria, aluminoborosilicate, and silicon carbide.